United Nations A/54/339

General Assembly

Distr.: General
10 September 1999

Original: English

Fifty-fourth session
Item 66 of the provisional agenda*
Question of Antarctica

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Report of the Secretary-General

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Acronyms and abbreviations

AAC	Antarctic Advisory Committee (IUCN)
ADD	Arctic Environmental Data Directory
AEON	Antarctic Environmental Officers Network (CONMAP)
AGONET	Antarctic Geospace Observatory Network
AMANDA	Antarctic Muon and Neutrino Detector Array
AMD	Antarctic Master Directory
ASOC	Antarctic and Southern Ocean Coalition
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of the Southern Bluefin Tuna
CEP	Committee for Environmental Protection
CLIC	Climate and Cryosphere programme (WMO)
COMNAP	Council of Managers of National Antarctic Programmes
FAO	Food and Agriculture Organization of the United Nations
GCOS	Global Climate Observing System
GLOCHANT	Global Change and the Antarctic programme (SCAR)
GOOS	Global Ocean Observing System
GRID	Global Resource Information Database
IAATO	International Association of Antarctica Tour Operators
IASC	International Arctic Science Committee
ICSU	International Council of Scientific Unions
IGBP	International Geosphere-Biosphere Programme
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission
IOC-SOC	Intergovernmental Oceanographic Commission-Intergovernmental Committee for the Southern Ocean
IUCN	World Conservation Union
IWC	International Whaling Commission
JCADM	Joint Committee on Antarctic Data Management
PATA	Pacific Asia Travel Association
SCALOP	Standing Committee on Antarctic Logistics and Operations (COMNAP)
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Oceanic Research

UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WCRP	World Climate Research Programme (WMO)
WMO	World Meteorological Organization

I. Introduction

1. The present report[1] has been prepared in response to General Assembly resolution 51/56 of 10 December 1996, on the question of Antarctica, and, in particular, to paragraph 4 of that resolution, in which the Assembly requested that a report on the information supplied by the Antarctic Treaty Consultative Parties on their meetings, their activities in Antarctica and on developments in relation to Antarctica be submitted to the General Assembly at its fifty-fourth session.

2. Information has been drawn from the final reports of the Twenty-first Antarctic Treaty Consultative Meeting, held at Christchurch, New Zealand, from 19 to 30 May 1997; the Twenty-second Meeting, held at Tromso, Norway, from 25 May to 5 June 1998; and the Twenty-third Meeting, held at Lima, from 24 May to 4 June 1999. The report is supported, as appropriate and necessary for its comprehensiveness, by factual information contained in the Final Reports of the Consultative Meetings.

II. Activities of the Antarctic Treaty system and international bodies

A. Antarctic Treaty

3. The Antarctic Treaty[2] was adopted on 1 December 1959 and entered into force on 23 June 1961. During the period under review, Bulgaria obtained Consultative Party (voting) status in 1998,[3] and Venezuela acceded to the Treaty on 24 March 1999.[4] As at 21 May 1999, there were 44 States parties to the Treaty, of which 27 are Consultative Parties.[5]

4. The primary purpose of the Antarctic Treaty is to ensure, in the interest of all mankind, that Antarctica should continue forever to be used exclusively for peaceful purposes and should not become the scene or object of international discord. To this end, the Treaty prohibits any measures of a military nature, and froze the positions of States with regard to territorial sovereignty. The Treaty provides for freedom of scientific investigation and promotes international cooperation in scientific research. It also prohibits any nuclear explosions in Antarctica and the disposal of radioactive waste material. At the Twenty-third Antarctic Treaty Consultative Meeting, the consultative parties adopted the Lima Declaration on the occasion of the fortieth anniversary of the signing of the Antarctic Treaty, by which they reiterated their commitment to the principles of the Antarctic Treaty and to the objectives of its Protocol on Environmental Protection.

5. To ensure the observance of the provisions of the Treaty, Consultative Parties have the right to designate observers to carry out inspections in all areas of Antarctica. Since the Twentieth Consultative Meeting in 1996, three inspections have been carried out. In December 1996, Norway undertook an inspection of four stations, all situated in Dronning Maud Land. The stations inspected were Maitri (India), Neumayer (Germany), Novolazarevskaya (Russian Federation) and SANAE IV (South Africa). The inspection reported that all stations were used for purposes consistent with the provisions of the Treaty.[6] In January 1999, Germany and the United Kingdom of Great Britain and Northern Ireland carried out a joint inspection of 11 permanent stations, six summer-only stations, four historic sites and monuments and two tourist vessels, all situated in the Antarctic Peninsula region.[7] The stations and facilities inspected were those of 11 Consultative Parties (Argentina, Bulgaria, Chile, China, Germany, Poland, Russian Federation, Spain, United Kingdom, United States of America and Uruguay) and one non-Consultative Party

(Ukraine).[8] One of the tourist vessels inspected was flagged with a non-Treaty Party (Bahamas). No infringements of the Antarctic Treaty were observed at any of the permanent stations, summer-only bases, historic sites and monuments or tourist vessels inspected. Strenuous efforts were being made at all stations to comply with the provisions of the Madrid Protocol, although operational practices were variable and gaps in implementation were evident, most notably with respect to environmental impact assessments.[7] In March and April 1999, a joint inspection was conducted by Belgium and France in eastern Antarctica. The final report on this inspection will be presented at the Twenty-fourth Antarctic Treaty Consultative Meeting.[9]

6. Every year, the Consultative Parties meet for the purpose of exchanging information, consulting together on matters of common interest pertaining to Antarctica, and formulating and recommending to their Governments measures for the furtherance of the principles and objectives of the Treaty. The last three Antarctic Treaty Consultative Meetings (the Twenty-first to Twenty-third) were held at Christchurch, New Zealand, from 19 to 30 May 1997; Tromso, Norway, from 25 May to 5 June 1998; and Lima, from 24 May to 4 June 1999, respectively. Since 1983, States parties to the Antarctic Treaty that are not Consultative Parties have been invited to attend the Consultative Meetings as observers.[10] International organizations have also been invited to attend as experts since 1989.[10] They include the Antarctic and Southern Ocean Coalition (ASOC), the International Association of Antarctica Tour Operators (IAATO), the Intergovernmental Oceanographic Commission (IOC), the International Hydrographic Organization (IHO), the International Maritime Organization (IMO), the Pacific Air Travel Association (PATA), the United Nations Environment Programme (UNEP), the World Conservation Union (IUCN), the World Meteorological Organization (WMO) and the World Tourism Organization. It was suggested at the Twenty-third Meeting that the meetings could be biannual, as they had been in the past.

7. Although there is an agreement among the Consultative Parties on the need to establish a permanent, cost-effective secretariat to serve and support their meetings, no consensus has been reached on the issue of its location and its modalities. Constructive dialogue is being held between Argentina and the United Kingdom to help resolve the issue of location.

B. Protocol on Environmental Protection to the Antarctic Treaty

8. The Protocol on Environmental Protection to the Antarctic Treaty (the Madrid Protocol) was adopted and opened for signature on 4 October 1991. Following its ratification by all Consultative Parties, the Protocol entered into force on 14 January 1998. As at 21 May 1999, there were 28 Parties to the Protocol, including all Consultative Parties and one non-Consultative Party, Greece.[11]

9. The main purpose of the Madrid Protocol is to provide for the comprehensive protection of the Antarctic environment and dependent and associated ecosystems. To this end, the Protocol designates Antarctica as a natural reserve, devoted to peace and science, prohibits mineral resource activities other than scientific research, and sets principles and measures for the planning and conduct of all activities in the Antarctic Treaty area. The Protocol comprises five annexes dealing with environmental impact assessment (annex I), conservation of Antarctic fauna and flora (annex II), waste disposal and waste management (annex III), prevention of marine pollution (annex IV) and area protection and management (annex V).

10. Annexes I to IV formed an integral part of the Protocol at the time of its adoption. Annex V, which was adopted subsequently, requires separate ratification by all Consultative

Parties to enter into force. Four Parties have not yet ratified annex V but made statements at the twenty-third Consultative Meeting, indicating that they had all initiated internal processes that were expected to lead to ratification of annex V before the Twenty-fourth Meeting.[12]

11. For several years, States parties to the Antarctic Treaty have discussed drafts for one or more annexes to the Madrid Protocol on liability for environmental damage. No agreement has yet been reached on a draft annex. Further details on this matter are given in Section III.K below.

12. National implementation of the Protocol has been reported on at the last three Consultative Meetings by New Zealand,[13] the United Kingdom,[14] Norway,[15] China,[16] Japan,[17] Brazil,[18] the Netherlands,[19] Uruguay,[20] Chile,[21] the Russia Federation,[22] the United States of America,[23] Finland,[24] Bulgaria[25] and Spain.[26]

13. As foreseen in articles 11 and 12 of the Protocol, a Committee for Environmental Protection (CEP) has been established to, *inter alia*, provide advice and formulate recommendations on the implementation of the Protocol for consideration at the Consultative Meetings. Since the entry into force of the Protocol, CEP has met once each year in 1998 and 1999, in conjunction with the Consultative Meetings. Issues discussed during the two meetings of CEP are reflected in section III.C below.

C. Convention for the Conservation of Antarctic Seals

14. The Convention for the Conservation of Antarctic Seals was adopted on 1 June 1972 and entered into force on 11 March 1978.[10] Since the Twentieth Antarctic Treaty Consultative Meeting, there have been no accessions to the Convention. As at May 1999, there were 16 States parties.[27]

15. The United Kingdom, as the Depositary Government for the Convention for the Conservation of Antarctic Seals, reported on the numbers of the six species of Antarctic seal captured or killed in the Convention area (the sea south of 60 degrees south latitude) by States parties to the Convention during the period 1 March 1995-28 February 1998.[28] Detailed information is given in paragraph 131 and table 2 below.

D. Convention on the Conservation of Antarctic Marine Living Resources

16. The Convention on the Conservation of Antarctic Marine Living Resources was adopted on 20 May 1980 and entered into force on 7 April 1982.[29] Since the Twentieth Consultative Meeting, there have been no accessions to the Convention. As at May 1999, there were 29 parties.[29]

17. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) reported on fisheries in the Convention area by States parties to the Convention for the 1996/1997, 1997/1998 and 1998/1999 seasons.[30] These data and management measures are summarized in section III.H below.

18. A new regulation was introduced for new fisheries of toothfish during the 1996/1997 season to reduce the risk of localized over-fishing and augment the collection of data for stock assessment.[31]

19. To help address illegal fishing activities, the CCAMLR system of inspection was amended in order to increase its efficiency. Supplementary information on fishing vessel

registration and fishing methods is requested and new procedures for processing reports of inspection were adopted. Five inspections were undertaken during the 1995/1996 season and four during the 1996/1997 season, off South Georgia.[32] Inspections were also carried out during the 1997/1998 season. CCAMLR-designated inspectors reported overall compliance with fisheries regulations, although some provisions of the conservation measures on the use of plastic packaging bands and requirements for line weighting and offal discharge were not fully complied with. Several members of CCAMLR have also established satellite-based monitoring of the movement of their vessels in waters under their national jurisdiction or have conducted pilot studies on the evaluation of different vessel monitoring systems.

20. Under the Scheme of International Scientific Observation set up in 1991, international scientific observers were placed on vessels during the 1995/1996, 1996/1997 and 1997/1998 seasons and provided 100 per cent coverage of all long-line fisheries and new fisheries in those seasons. The data provided by the scheme are important to assess fish stocks, as well as the effectiveness of the measures taken to mitigate seabird by-catch in long-line fisheries.

21. As part of the CCAMLR Ecosystem Monitoring Programme, work on a conceptual model of ecosystem monitoring and management has continued, focusing on improving our understanding of the processes and linkages among harvested species, dependent species and the environment. Data on dependent species are being collected at 16 sites within the Convention area. Progress has also been made on the analysis of biological indices, in particular the identification of anomalies and trends.[31] Work is continuing on ways of incorporating the Ecosystem Monitoring Programme indices into the CCAMLR strategy for managing Antarctic marine living resources.

22. The CCAMLR Scientific Committee has further strengthened its cooperation with other organizations. Representatives of ASOC, the Commission for the Conservation of the Southern Bluefin Tuna (CCSBT), the Food and Agriculture Organization of the United Nations (FAO), IOC, IUCN, the International Whaling Commission (IWC), the Scientific Committee on Antarctic Research (SCAR) and the Scientific Committee on Oceanic Research (SCOR) attended the fifteenth meeting of CCAMLR. IWC and IUCN were also invited to send observers to the 1997 meeting of the CCAMLR working group on ecosystem monitoring and management.[31] The Chairman of the Scientific Committee participates as an observer in the work of the Committee for Environmental Protection, established under the Madrid Protocol.

23. In its resolution 2 (1999), the Twenty-third Antarctic Treaty Consultative Meeting recommended that the list of specially protected species be reviewed by SCAR together with CCAMLR, Consultative Parties and other expert bodies, with a view to including new species, where appropriate, and removing species from the list where no longer appropriate.

E. Scientific Committee on Antarctic Research

24. The Scientific Committee on Antarctic Research (SCAR) was established as a scientific committee of the International Council of Scientific Unions (ICSU). It was established in 1958 with the purpose of initiating, promoting and coordinating scientific research in Antarctica.

25. The membership of SCAR in 1999 is 26 full members, 6 associate members and 7 members of ICSU.[33]

26. There are four groups of specialists set up within the framework of SCAR, which meet once a year: the Group of Specialists on Environmental Affairs and Conservation (GOSEAC); the Group of Specialists on Antarctic Neotectonics (ANTEC); the Group of Specialists on Global Change and the Antarctic (GLOCHANT); and the Group of Specialists on Seals.

27. There are also eight working groups which deal with questions of biology, geodesy and geographic information, geology, glaciology, human biology and medicine, physics and chemistry of the atmosphere, solar-terrestrial and astrophysical research, and solid-earth geophysics. The working group on human biology and medicine has dual roles in research and medical practice. It also has an operational role in liaising with polar medical groups to improve Antarctic health-care services.

F. Council of Managers of National Antarctic Programmes

28. The Council of Managers of National Antarctic Programmes (COMNAP) was established in 1988 to provide a forum to facilitate the exchange of views and experience between directors and logistics managers of national Antarctic agencies and to improve the effectiveness of operations in Antarctica. COMNAP has a permanent Standing Committee on Antarctic Logistics and Operations (SCALOP).

29. With increasing emphasis on global change, there are greater numbers of integrated research projects that may involve multiple countries. Major collaborative international programmes requiring large-scale support by COMNAP include the European Project for Ice Coring in Antarctica (EPICA), for which core drilling operations were commenced at Dome C in 1996. Other major programmes are the Cape Roberts project and Lake Vostok drilling project (see paras. 82-84 below), the Concordia project and the International Trans-Antarctic Scientific Expedition (ITASE).[34] The Antarctic Muon and Neutrino Detector Array (AMANDA) project was supported at the South Pole (see para. 77 below).

30. Infrastructural developments have included a new water treatment plant installed at Neumayr, the opening of the new South African base, SANAE IV, at Vesleskarvet, a new facility at Rothera (the Bonner Laboratory), and a new energy system based on butane gas installed at the Swedish station Wasa.

31. Intercontinental air access is improving. In 1997/1998, South African national programme personnel were flown to Dronning Maud Land by a commercial operator. A SCALOP subgroup has been formed to pursue the development of an intercontinental east Antarctic air network that could potentially serve those stations located in Antarctica between 10 degrees west and 140 degrees east. Preliminary investigations have commenced on the construction of a compacted snow airstrip in the Prydz Bay region of east Antarctica. These developments will extend the ability to fly personnel for short visits to the Antarctic beyond the traditional access points of McMurdo and the Antarctic Peninsula.

32. COMNAP has established an Antarctic Environmental Officers Network (AEON) and the COMNAP Environmental Coordinating Group to facilitate sharing of environmental management information. The objectives of AEON are to exchange information and ideas about practical and technical environmental issues in Antarctica, to promote mutual understanding and practical application of the Madrid Protocol, and to respond to requests from COMNAP for advice on environmental issues. The Environmental Coordinating Group will provide a link between AEON and COMNAP.

33. SCAR and COMNAP are jointly developing an environmental monitoring handbook that will aid the standardization of data collection methodologies in the Antarctic region.

34. SCAR and COMNAP work closely together towards the goal of making international cooperation in Antarctic science more efficient.

35. COMNAP and IAATO meet together twice each year to facilitate cooperation.

36. There is an increase in the contracting of private sector organizations for logistical and infrastructural support by national Antarctic agencies. In addition, tour ships are being used to support some scientific activities.

G. International organizations

Antarctic and Southern Ocean Coalition

37. Since the Twentieth Antarctic Treaty Consultative Meeting, held at Utrecht, the Netherlands, ASOC and its member groups have participated in and monitored work carried out under the Antarctic Treaty system. The primary focus of ASOC in 1996 and 1997 has been working with individual States parties to achieve ratification of the Madrid Protocol on Environmental Protection. ASOC has developed a list to show efforts taken by the parties to implement each provision of the Madrid Protocol.

38. ASOC also encourages parties to introduce the best available environmentally sound technologies into Antarctic operations.

39. ASOC maintains an interest in fisheries activity and supports the CCAMLR precautionary management approach and conservation of Antarctica's marine living resources.

40. ASOC has directed substantial attention and resources to the question of one or more annexes to the Madrid Protocol, concerning liability.

41. ASOC also sends an observer to meetings of the International Whaling Commission (IWC).

International Association of Antarctic Tour Operators

42. IAATO was founded by seven private tour operators in 1991 and has grown to include 30 member and associate member companies in Argentina, Australia, Belgium, Canada, Chile, Germany, Japan, the Netherlands, New Zealand, the United Kingdom and the United States.[35] The majority of tourist ships to the Antarctic are IAATO members (all in 1996/1997, and all but one in 1997/1998).[36] Some yacht operators are joining IAATO. IAATO members do not include companies with ships carrying over 400 passengers; at present, IAATO member companies agree to carry a maximum of 400 passengers per voyage. IAATO was to discuss this issue at its meeting in July 1999.

43. During 1995/1996, IAATO focused its activities on: (a) increasing the level of cooperation and standardization among its members; (b) recruiting new members to the organization; and (c) conducting effective environmental impact assessments in connection with the activities of members in the Antarctic. In 1998, all IAATO members prepared an environmental impact assessment of planned activities for the 1998/1999 season.

44. IAATO members continue the practice of safeguarding against the introduction of alien species to Antarctica. This includes boot-washing stations on all tour vessels and prohibition of discharge of ballast water.

45. IAATO manages tourist numbers so that no more than 100 people are ashore at a site at any one time. IAATO has a site selection process to minimize environmental impact. All IAATO member companies have shipboard oil pollution emergency plans.

International Hydrographic Organization

46. The permanent Working Group on Cooperation in Antarctica of IHO has reported annually to the Antarctic Treaty Consultative Meetings since its establishment in 1992. The group is currently known as the IHO Hydrographic Committee on Antarctica.

47. From 1993 to 1997, the main concern of the Hydrographic Committee on Antarctica was the establishment of an internationally approved chart scheme for Antarctic waters and the encouragement of increased effort in hydrographic surveying of the Antarctic coast. By the end of 1996, much had been achieved. In 1997 and 1998, some effort was devoted to establishing contact with the operators of non-governmental vessels, especially tourist vessels, through links with IAATO.

48. IHO cooperates with COMNAP, SCAR and IAATO. IAATO statistics have revealed that cruise ships were regularly visiting four sites for which adequate survey data do not exist; this can now be rectified.

49. In 1997/1998, five IHO member States mounted hydrographic surveying expeditions in Antarctic waters.[37] From these surveys, 9 new charts were scheduled for publication in 1998 with a further 17 planned by the end of 2000.

Intergovernmental Oceanographic Commission

50. IOC was founded in 1960 within the United Nations Educational, Scientific and Cultural Organization (UNESCO). The Commission implements programmes within three subject areas: (a) marine sciences; (b) ocean services; (c) training, education and mutual assistance and capacity-building. In 1967, IOC established the Intergovernmental Committee for the Southern Ocean (IOC-SOC) to promote and coordinate oceanographic observations and research in the Southern Ocean.[38]

51. IOC took a lead role in establishing the Global Ocean Observing System (GOOS). GOOS aims to meet the need for: (a) forecasting climate variability and change; (b) assessing the state of health of the marine environment and its resources (including the coastal zone); and (c) supporting an improved decision-making and management process which takes into account potential natural and man-made changes in the environment and their effects on human health and resources.

52. IOC held a Southern Ocean forum in September 1996, providing an opportunity for scientists and operators working under the United Nations system, the Antarctic Treaty system or ICSU to share views and formulate joint action on the investigation and exploration of the Southern Ocean. The results of the meeting were used by IOC to revise the terms of reference for IOC-SOC.

International Maritime Organization

53. The Convention establishing IMO was adopted on 6 March 1948 at a conference convened under the auspices of the United Nations, and entered into force on 17 March 1958. The IMO Assembly met for the first time on 6 January 1959.

54. The involvement of IMO in Antarctic matters relates primarily to the prevention and control of marine pollution from ships and to maritime safety. At present, IMO is developing an international code of safety for ships in polar waters (see para. 112 below). The purpose

of the code is to ensure the safe navigation of ships and the prevention of pollution in polar waters.

World Conservation Union

55. IUCN is a partnership of States, governmental agencies and non-governmental organizations founded in 1948. It has at present 880 members, including 173 State and governmental agency members from 133 countries.[39] The mission of IUCN is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature so as to ensure that any use of natural resources is equitable and ecologically sustainable. IUCN has established six commissions, of which two, those on protected areas and on environmental law, make significant contributions to the IUCN Antarctic programme.

56. IUCN organized a technical workshop in Washington, D.C., in September 1996 on the theme "Cumulative environmental impact in Antarctica: minimization and management".

57. The IUCN Antarctic Advisory Committee (AAC) was reconstituted in 1996 with the mandate to provide guidance to the IUCN Antarctic programme and contribute to its implementation. AAC is comprised of 12 members, appointed by the Director-General of IUCN, with expertise in Antarctic, sub-Antarctic or Southern Ocean matters.

United Nations Environmental Programme

58. UNEP was established in 1972 to serve as a focal point for environmental action and coordination within the United Nations system.

59. UNEP has closely linked global programmes on the conservation, management and monitoring of the marine environment and its living resources. They include the Global Plan of Action for the Conservation, Management and Utilization of Marine Mammals, the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities and the Regional Seas Programme.

60. The assessment programme of UNEP has particular responsibility for carrying out the functions of UNEP concerning the state of the environment. UNEP is currently finalizing the second volume of the *Global Environment Outlook* series, which will be released in autumn 1999 and will cover the two polar regions.

61. UNEP administers the secretariats of various global conventions that deal with subjects relevant to Antarctica and the Southern Ocean. They include the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on Biological Diversity, the Convention on International Trade in Endangered Species of Wild Fauna and Flora and the Convention on the Conservation of Migratory Species of Wild Animals.

World Meteorological Organization

62. WMO, which was established in 1950, is a specialized agency of the United Nations system. The major activity of WMO, providing the international framework for meteorological observations and data exchange, has contributed considerably to weather forecasting.

63. In collaboration with ICSU, WMO has played a pioneering role in the global coordination of geophysical and meteorological experiments.

64. WMO maintains the World Weather Watch, of which an important part is the Antarctic Basic Synoptic Network. The operation and maintenance of this network and the timely transmission of the observational data by means of the Global Telecommunications System

are essential in providing meteorological data for global weather analysis and prediction models and research. The data and models allow monitoring of climate change and the environment.

65. The WMO Executive Council has established a working group on Antarctic meteorology which provides guidance to WMO, coordinates Antarctic programmes and develops schemes for the dissemination of information.

66. The inclusion of automatic weather stations in the Antarctic Basic Synoptic Network (comprising 35 staffed stations, including 14 upper-air stations and more than 60 active automatic weather stations)[40] has led to a substantial increase in the availability of synoptic weather data from the Antarctic continent. The International Programme for Antarctic Buoys (IPAB) has provided a network of drifting buoys within the seasonal sea-ice zone of the Southern Ocean, providing data for operational and research purposes. Data are also provided from voluntary observing ships.

67. The Global Climate Observing System (GCOS) includes 18 Antarctic surface observing stations among the 984 surface stations throughout the world, and 12 Antarctic upper-air stations of 150 such stations throughout the world.[41]

68. The Global Atmosphere Watch of WMO coordinates two long-standing measurement programmes: the Global Ozone Observing System and the Background Air Pollution Monitoring Network. The Global Atmosphere Watch is a basic worldwide network for observations on climate change.[42]

69. The World Climate Research Programme (WCRP) will be expanded into a broader programme on Climate and Cryosphere (CLIC). The main purpose of CLIC is to provide a globally integrated approach to the study of the role of the cryosphere in the climate system.[41]

70. In carrying out its Antarctic activities, WMO cooperates with SCAR, COMNAP and IOC.

III. Recent developments pertaining to the Antarctic environment

A. Science and support activities

Science support sites

71. A number of parties to the Antarctic Treaty have made efforts to clean up their bases, including Germany and Norway.[43]

72. Energy efficiency at science support sites is being actively investigated by a number of countries (including Chile,[44] Sweden,[45] Japan,[46] and the Russian Federation[47]), including utilization of alternative forms of energy production. COMNAP has a working group on alternative energy.

Weather and solar-terrestrial sciences

73. There are a considerable number of meteorological reporting networks supporting Antarctic operations and research, including over 60 automated weather stations, 14 stations providing upper-air soundings, and satellites providing information. Thirty-five weather stations are staffed year round, but only 16 of these are on the Antarctic continent and there are only 2 in the interior (South Pole and Vostok).[48] As a result of economic considerations, the coverage of the upper-air network is gradually being reduced (with only the South Pole

station in the interior) while the surface network is being expanded with automatic weather stations on the continent and drifting meteorological buoys in the seasonal sea-ice zone.[43] The west Antarctic sector and adjacent Southern Ocean and South Pacific Ocean up to the subtropical latitudes comprise the largest area devoid of good quality surface or upper-air observations from staffed stations.[43] Lack of meteorological monitoring stations can affect air transport operations.

74. Telecommunication systems ensure the rapid and reliable collection and exchange of meteorological information to meet WMO requirements. In particular, satellite communications are improving Antarctic telecommunications.

75. Geospace information is being collected from the Antarctic Geospace Observatory Network (AGONET) of automatic geophysical observatories. This information includes data on magnetometry, riometry and very low frequency radio waves. The network is composed of high-frequency radar and ground-based observation sites.

76. The first regional observing study of the troposphere has been completed; it has provided extensive new data sets on the Antarctic troposphere. The analysis of weather forecasts and monitoring of the Global Telecommunications System of WMO have allowed improvements to be made to both weather forecasting and data communications.

77. The AMANDA project has successfully installed 382 optical modules in 14 long strings buried from 800 to 2,200 metres deep in the ice at South Pole station.[49] This neutrino telescope project has been producing data since 1996.

Data and metadata

78. The Antarctic Master Directory (AMD) provides information on the types of Antarctic data in each country and how the data can be accessed. Information is contributed to AMD by national Antarctic data centres, of which there are currently nine in operation, with the centre in Spain to become operational in the near future. AMD is publicly available via a World Wide Web interface and currently holds about 600 records. The SCAR and COMNAP Joint Committee on Antarctic Data Management (JCADM) is active in promoting the establishment of national Antarctic data centres and, by resolution 4 (1998), has encouraged countries to form them. By the same resolution, JCADM reiterated the importance of access to scientific information, and the role played in this by data management, in accordance with article II (1) (c) of the Antarctic Treaty.

Global change

79. SCAR is integrating all of its Global Change and the Antarctic (GLOCHANT) programmes into the general framework of the International Geosphere-Biosphere Programme (IGBP). There are now four individual GLOCHANT programmes (reduced from seven): (a) ASPECT (Antarctic Sea-ice Processes, Ecosystems and Climate); (b) PICE (Palaeoenvironmental Records from Antarctic Ice Cores); (c) ITASE (International Trans-Antarctic Scientific Expedition) which deals with the recent history of climate change; and (d) ANTIME (Antarctic Ice Margin Evolution).

80. Three programmes are no longer within the GLOCHANT framework: (a) EASIZ (Ecology of the Antarctic Sea-ice Zone) has been transferred to its parent working group on biology; (b) BIOTAS (Biological Investigations of Terrestrial Antarctic Systems) is to be terminated and a new integrated programme on terrestrial biology is to be established; and (c) ISMASS (Antarctic Icesheet Mass Balance and Sea-level Contributions) was included in the grouping but is now coordinated under the SCAR working group on glaciology.

81. There are a number of contemporary Antarctic processes that affect the earth's climate system. In addition, the Antarctic environment provides information on global climate changes. Documented changes in Antarctica[50] include local climate warming (by about 2.5 degrees Celsius on the Antarctic Peninsula),[51] loss of ice shelves and sea ice, increased ultraviolet radiation at the surface, changes in Antarctic terrestrial ecosystems, including increasing terrestrial biodiversity (e.g., increased abundance of vascular plants on Antarctic Peninsula),[51] declining penguin populations linked to changes in krill availability and sea-ice patterns,[51] and changes in Antarctic precipitation (observed on the Antarctic Peninsula).[51] Increases in the populations of both the southern fur seal and the southern elephant seal have been noted at Palmer Station; these may have resulted from decreased sea ice since the two species prefer open water.[51]

Earth sciences and glaciology

82. The Cape Roberts project, which was established to investigate the history of uplift of the Trans-Antarctic Mountains and the past 100 million years of climate history, was postponed in 1996 as the result of unstable sea ice,[52] had a short season of drilling in 1997 as a result of weakening of the sea ice, collecting 148 metres of core, but had a very successful season in 1998, collecting over 600 metres of core.

83. Collaborative research is being carried out under the European Project for Ice Coring in Antarctica.

84. Lake Vostok is generating considerable scientific interest. No coring of the Lake has yet taken place, with drilling stopping approximately 100 metres above the Lake. The project will be subjected to a comprehensive environmental evaluation before any drilling into the Lake is attempted.[53] Ice overlying the Lake is 3,750 metres thick and the water layer is 670 to 800 metres thick.[54] SCAR is to convene a workshop on subglacial lakes beneath the ice sheet in September 1999.

85. The ocean drilling project has successfully drilled nine holes in the Antarctic Peninsula region with advice from the Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Subcommittee of SCAR. The second leg is planned for the Prydz Bay region in January 2000.

86. Permanent geodetic sites have been established in Antarctica for gravity, positional, interferometric, earth-tide, marine-tide and seismic measurements. An integrated digital anomaly map has been created. The Group of Specialists on Antarctic Neotectonics has been convened to coordinate investigations using the new seismic and geodetic techniques now available.

87. A comprehensive gazetteer of Antarctic geographical features (with 37,000 names) has been created and is available on the Internet. The Antarctic digital database is currently being revised and is also available on the Internet.

Life sciences

88. A new SCAR subcommittee has been formed to look at the evolution of Antarctic organisms.

89. A coordinated census of seals was carried out under the Antarctic Pack-Ice Seals Programme (APIS) in the 1997/1998 and 1998/1999 seasons.

90. At present, there are no provisions in the Antarctic Treaty to deal with potential exploitation of biological Antarctic resources. This needs to be addressed since biological prospecting and patenting is an issue of growing concern throughout the world.

91. Data are being compiled on the breeding distributions and abundance of seabird populations. Of concern is an observed decrease in the number of southern giant petrels.[55]

92. Studies have confirmed the deleterious impact of ultraviolet light on plankton and bacteria.[56] This emphasizes the potential effects of ozone depletion, as described in section G below.

B. Environmental monitoring and state of the environment report

Environmental monitoring

93. In accordance with recommendation XV-5 of the Fifteenth Antarctic Treaty Consultative Meeting, held in Paris in 1989, there are a series of activities that should be monitored: waste disposal, contamination by hydrocarbons or toxic chemicals, construction and operation of logistical facilities, conduct of scientific programmes, and recreational activities. A consolidated report on monitoring the impact of scientific activities and operations in Antarctica, which resulted from two workshops convened by SCAR and COMNAP, was sent to all Consultative Parties in November 1996.[57] Based on the results and recommendations of the two workshops, the United States of America is developing an environmental monitoring programme.[58]

94. SCAR and COMNAP have an important role to play in ensuring comparability of monitoring data. They are developing an environmental monitoring handbook, a review of existing data and key research issues, and a procedure for data management. These activities will aid the synthesis of data and coordination of monitoring activities in order to prevent duplication of effort.[57] A first draft of the handbook will be discussed at a meeting to be held in Goa, India, in September 1999.

State of the Antarctic environment report

95. While it is acknowledged that a state of the Antarctic environment report could be a valuable benchmark for monitoring environmental change, there is still concern about a number of issues related to such a report, including its scope, focus, cost and the process for its production.

96. SCAR is to prepare a study on the scope of such a report with support from CCAMLR, COMNAP and WMO. This study will be presented at the Twenty-fourth Antarctic Treaty Consultative Meeting. The study will follow on from the report of intersessional working groups coordinated by New Zealand (reported on at the Twenty-second Antarctic Treaty Consultative Meeting)[59] and Sweden (reported on at the Twenty-third Meeting)[60] which were to clarify the above-mentioned issues.

97. New Zealand is preparing a Ross Sea region state of the environment report by the year 2000 with other parties active in the region.[61] This report may be used as a pilot for a continent-wide report, but the timing of a state of the Antarctic environment report will not be tied to the completion of the former report.

C. Environmental impact assessment

98. In accordance with the Protocol on Environmental Protection (art. 8 and annex I), environmental impact assessment procedures have been developed for activities undertaken in the Antarctic. Where the impact will be less than minor or transitory, an initial

environmental evaluation is to be prepared, as described in article 2 of annex I. If an initial environmental evaluation shows that the impact will be no more than minor or transitory, then the activity may proceed provided procedures are put in place to assess and verify the impact of the activity. If the impact is likely to be more than minor or transitory, a comprehensive environmental evaluation must be carried out as described in article 3 of annex I. Draft and final comprehensive environmental evaluations must be considered by Antarctic Treaty Consultative Meetings and final evaluations must include any comments made on the draft texts. Appropriate monitoring must be described in a comprehensive environmental evaluation and must be carried out during and after the activity.

99. At the Twenty-first Antarctic Treaty Consultative Meeting, there was considerable discussion on what is understood by the terms "minor" and "transitory", as referred to in annex I to the Protocol on Environmental Protection. Intersessional work on this issue had been led by New Zealand.[62] It was noted by several Consultative Parties that determination of the status of activities was context-dependent, based on value judgements and information available at the time. The SCAR delegation noted that transparency of methodology would allow parties to assess the basis of determination. At the Twenty-second Antarctic Treaty Consultative Meeting, it was clarified by CEP that precise definitions might be impossible and that concepts would evolve from practical experience. [63]

100. In the formulation of initial and comprehensive environmental evaluations, the cumulative impacts are to be considered, including those of all relevant past, present and reasonably foreseeable activities. In the case of tourist activities, a programmatic approach may be the best way of assessing the possible cumulative impacts.

101. Draft comprehensive environmental evaluations are to be forwarded to CEP at the same time as they are sent to Consultative Parties, at least 120 days before the Antarctic Treaty Consultative Meeting. This gives the Committee for Environmental Protection the opportunity to comment on all such evaluations. For the Committee for Environmental Protection to consider all draft comprehensive environmental evaluations, it would need to meet every year even if Antarctic Treaty Consultative Meetings were to take place on a biannual basis. Given that the Protocol requires that consideration of draft comprehensive environmental evaluations not delay the decision to proceed with a proposed activity by more than 15 months, if Antarctic Treaty Consultative Meetings were to become biannual, a special consultative meeting could be held after a meeting of the Committee for Environmental Protection in the intervening year, with the single agenda item being that of consideration of comprehensive environmental evaluations.[64]

102. In resolution 2 (1997) the Twenty-first Antarctic Treaty Consultative Meeting encouraged parties to include in any comprehensive environmental evaluation a process to review the activities undertaken, to record any changes to planned activities, and to report to the parties on the review of the activities undertaken and changes recorded to the planned activities.

103. In resolution 1 (1999) the Twenty-third Antarctic Treaty Consultative Meeting recommended that the guidelines for environmental impact assessment in Antarctica be made available for use by those engaged in the preparation of environmental impact assessments. These guidelines are not mandatory, but were agreed upon by the Committee for Environmental Protection. Use of the guidelines could, over time, lead to a better joint understanding of the environmental impact assessment process and to more uniform practice.

104. From 1988 to 1996, 69 IEEs and 10 comprehensive environmental evaluations and 8 environmental audits or reviews were carried out.[65]

D. Safety of operations, emergency response and contingency planning

105. Article 15 of the Protocol on Environmental Protection sets out requirements for appropriate responses to environmental emergencies. These include prompt and effective emergency response action, the establishment of procedures for notification of and cooperative response to environmental emergencies, and the development of contingency plans for response to incidents in the Antarctic that might have adverse effects on the Antarctic environment or ecosystems, including cooperation in the formulation and implementation of such plans.

106. By resolution 1 (1997), the Twenty-first Antarctic Treaty Consultative Meeting recommended that Consultative Parties whose research stations and vessels operating in Antarctica were not covered by contingency plans should introduce such plans and, as far as practical, carry out regular contingency exercises. This resolution followed from the finding of a 1996 survey that approximately 40 per cent of Antarctic research stations had no oil-spill contingency plans, while over 80 per cent of vessels had a shipboard oil pollution emergency plan.[66] The proliferation of stations and vessels makes contingency planning essential.

107. By resolution 6 (1998), the Twenty-second Antarctic Treaty Consultative Meeting recommended the adoption of COMNAP/SCALOP guidelines on fuel oil handling, spill prevention, containment, contingency planning and reporting. These guidelines are to be reviewed and revised by COMNAP/SCALOP, as appropriate. In the Antarctic Peninsula, Prydz Bay and Ross Sea areas, work is being undertaken on regional oil-spill contingency plans for areas involving more than one national operator.

108. COMNAP has also prepared guidelines for contingency planning for three types of events other than oil spills, namely, general incidents and disasters, chemical spills, and responses to international incidents and disasters. All national operators should be developing contingency plans for the various types of events mentioned above.

109. COMNAP suggests, from survey information, that the most common incidents with an environmental impact are oil spills. They are mostly small and confined to a station or base, or adjoining waters. Ground or air transport incidents have minor effects. There is a low probability of fuel spills in the marine environment but these pose a greater magnitude of environmental risk than do terrestrial spills.[67]

110. COMNAP is compiling data on all accidents in Antarctica, including data provided by IAATO on tourist incidents.

111. It is suggested that hazards in the vicinity of research stations be documented and that people visiting stations be made aware of potential hazards.[68]

112. Protection of the marine environment is embodied in the Madrid Protocol, in particular article 10 of annex IV, relating to the design, construction and operation of ships. IMO plans to finalize the international code of safety for ships in polar waters (the polar code) for formal adoption at the IMO Assembly in 2001. Since the draft polar code does not fully take cognizance of the environmental, operational, legal and political differences between the Arctic and Antarctic, the Twenty-second Antarctic Treaty Consultative Meeting, by resolution 3 (1998), recommended that Consultative Parties provide input to IMO to help develop the Antarctic elements of the code. The Twenty-third Antarctic Treaty Consultative Meeting encouraged IMO to develop a code with separate sections for the Arctic and Antarctic and by decision 2 (1999), decided to convene a meeting of experts to develop draft guidelines for Antarctic shipping and related activities.

E. Waste disposal and waste management

113. Annex III to the Protocol on Environmental Protection provides guidelines for waste disposal and waste management by Treaty Parties.

114. Countries are developing waste management plans, including Argentina for Marambio Station,[69] Italy for Terra Nova Bay Station,[70] and Japan for Syowa Station.[71]

115. The joint inspection carried out by Germany and the United Kingdom pointed to the need for greater consistency of waste management procedures and recommended that moderate or large-scale stations lacking sewage treatment (other than maceration) should consider upgrading their facilities.[7]

F. Prevention of marine pollution

116. Annex IV to the Protocol on Environmental Protection covers marine pollution. The annex regulates discharge of sewage, oil or oily liquids or other noxious liquids, disposal of garbage, preventive measures and emergency preparedness.

117. There has been an increase in the amount of marine debris in the Southern Ocean. Studies carried out up to 1996 suggested a decreasing trend but information from 1996 and 1997 suggests that this trend has not been sustained.[32] The CCAMLR secretariat is running an education initiative to reverse this trend. Long-term surveys of beached marine debris have been initiated at several Antarctic and sub-Antarctic sites by Australia, Brazil, Chile, the United Kingdom, the United States and South Africa with standard survey methods developed by CCAMLR.[32] There is evidence that increases in marine debris relate to increased fishing activity.[32] There is also continued accumulation of plastic packaging bands.[72] In addition, there is growing concern over the potential impact of fishing gear lost or abandoned by fishing vessels.[72]

G. Ozone depletion

118. There is a continued occurrence of the long-term depletion of total ozone over most of the southern hemisphere, with stronger depletion nearer the Antarctic continent.[73] There has been a corresponding increase in the component of ultraviolet radiation reaching the earth's surface.[73] The ozone depletion including both an increase in the area of depletion and lower values of ozone present, has been observed since 1978.[74] The hole observed in 1995 was similar to the severe holes detected in the early 1990s; the hole observed in 1996 was distinguished by its early development.[74] The hole of 1997 was similar to those of previous years, without the unusually early onset observed in 1996. The Antarctic ozone hole of 1998 was also broadly similar to those of recent years, although a little larger and longer-lasting with a maximum extent of 25 million square kilometres. There were only 90 Dobson units total column ozone at the centre, almost all lower stratospheric ozone was destroyed, and about one third of the total ozone in the middle stratosphere was unaffected.[73] This is a reduction of about 70 per cent of the total ozone in years prior to when the hole was first observed.[75] The region of enhanced ozone destruction is mainly confined to the area polewards from about latitude 60 degrees south.

119. The increased ozone depletion above the Antarctic results from chemical activity of chlorine and bromine in the stratosphere.[74] Chemical activity is fastest in the polar stratospheric clouds, created by extremely cold temperatures within the polar vortex.[75]

Chlorine is predicted to reach a maximum in the stratosphere by about 2000 then slowly decline; it may take until 2050 to return to levels prior to when the ozone hole was first observed.[73] Bromine may take longer than chlorine to decline, depending on emission rates. In addition, if the lower stratosphere continues to cool, as is being predicted from the continued accumulation of greenhouse gases, depletion of ozone may still not abate, since ozone destruction by chlorine/bromine is more efficient at lower temperatures.

120. Advanced technology allows forecasting of the escape of ozone-depleted air from Antarctic into lower latitudes.[76] This means advance warning can be given in Australia, New Zealand and South America of periods of increased ultraviolet radiation.

H. Conservation of Antarctic fauna and flora

121. Annex II to the Protocol on Environmental Protection covers conservation of Antarctic fauna and flora, including their protection, introduction of non-native species or diseases, exchange of information and specially protected species.

122. Work has been undertaken on the introduction of disease into Antarctic birds.[77] Australia hosted a workshop on this matter at Hobart in 1998. An intersessional working group will debate this matter and report back to the Twenty-fourth Antarctic Treaty Consultative Meeting.

123. IUCN noted that consideration must be given to avoiding the introduction of all species, from vertebrates to invertebrates, to viruses.[78]

124. There was a significant decline recorded in the populations of several species of seabirds to 1996.[31] This decline is largely attributed to long-line fishing operations where seabirds feed on long-line baits, become hooked and drown. The main species affected are black-browed, grey-headed and yellow-nosed albatrosses, and white-chinned petrels. It is estimated that 6,600 seabirds were killed in long-line fishing operations off South George, Prince Edward and Marino Islands during 1996/1997.[32] In addition, the incidental mortality of seabirds was estimated to be at least 20 times greater in unregulated fishing.[32] In 1997/1998, a further 50,000 to 89,000 seabirds were estimated killed in illegal, unregulated and unreported fishing; these catches are unsustainable for albatross, giant petrel and white-chinned petrel.[72]

125. CCAMLR has provided an educational book to fishing vessels in the Southern Ocean as part of its efforts to minimize seabird mortality. It has also moved to shift the start of the long-line fishing season towards May over 1998/1999 and 1999/2000 after findings that the interaction between seabirds and long-line fishing peaks during the austral summer.[72]

126. The reported[30] fisheries catches in tonnes are given in table 1 below. As can be seen in the table, reported catches of krill have decreased, while reported catches of finfish have increased.

Table 1
Reported fisheries catches in tonnes, 1994/1995 to 1997/1998

	Year			
	1994 1995	*1995 1996*	*1996 1997*	*1997 1998*
Krill	118 714	95 053	82 508	80 802
Finfish		8 826[a]	10 562[b]	11 419[c]
Crab		497	0	N/A
Squid		52	81	N/A

[a] Patagonian toothfish (*Dissostichus eleginoides*) accounted for 99 per cent of the catch.

[b] Patagonian toothfish accounted for 97 per cent of the catch.

[c] Patagonian toothfish accounted for 98 per cent of the catch.

127. There is continued development of new and exploratory fisheries (6 for 1996/1997, 12 for 1997/1998, and 6 for 1998/1999), for toothfish as well as deep water finfish and squid.[30] CCAMLR has established conservation measures for the fisheries, including obtaining information from the very beginning of fishing and establishing catch limits. CCAMLR also places international scientific observers on vessels (including on 100 per cent of long-line fisheries from the 1996/1997 season onwards). In addition, CCAMLR is establishing a catch documentation scheme for toothfish.

128. The Treaty parties are concerned about the unreported, unregulated and illegal fishing of toothfish which undermines the objective of CCAMLR. In resolution 3 (1999), the Twenty-third Antarctic Treaty Consultative Meeting recommended that Consultative Parties that are members of CCAMLR strongly support CCAMLR in its efforts to deal with unreported, unregulated and illegal fishing in the Convention area. It was noted that illegal fishing for toothfish threatens not only the toothfish, but also other dependent and related species, in particular seabirds that are killed incidentally.[72] Unreported toothfish catches are estimated at 74,000 to 82,000 tonnes in 1995/1996,[31] 107,000 to 115,000 tonnes in 1996/1997[32] and 22,415 tonnes in 1997/1998.[72] These estimated catches are greater than the amounts allowed in regulated catches.

129. Illegal fishing is being carried out not only by non-contracting parties to the Convention for the Conservation of Antarctic Marine Living Resources, but also by contracting parties.[32] In 1997/1998, 45 sightings of illegal fishing vessels were reported by members.[72] CCAMLR has established a vessel register for all vessels known to have fished in contravention of conservation measures.

130. Large-scale scientific whaling is still being conducted by Japan in the Southern Ocean whale sanctuary. In 1995/1996, 1996/1997 and 1997/1998, 440 Minke whales were killed, an increase from 330 in previous years.[79]

131. The reported capture and killing of seals in 1995/1996,[80] 1996/1997[81] and 1997/1998[27] has been relatively low, as shown in table 2 below. However, not all countries are reporting seal captures or kills. There is at present no known commercial sealing taking place in Antarctica.

Table 2
Reported capture and killing of seals, 1995/1996-1997/1998

	Year		
	1995/1996	*1996/1997*	*1997/1998*
Captured and released	160[a]	616[b]	520[c]
Killed	0	6[d]	0

[a] By Chile.

[b] By Norway and Chile.

[c] By Norway.

[d] By Norway (6 killed in pollution and diet studies).

I. Area protection and management

132. Consultative Parties adopted the Agreed Measures for the Conservation of Antarctic Flora and Fauna in 1964. Five categories of protected areas were established, of which the first three are included in recommendations that have entered into force: specially protected areas, sites of special scientific interest, and historic sites and monuments.

133. Annex V to the Protocol on Environmental Protection covers area protection and management, including designation procedures and management plans for Antarctic specially protected areas, Antarctic specially managed areas, and historic sites and monuments. When annex V enters into force, all existing sites of special scientific interest and specially protected areas will become Antarctic specially protected areas. In addition, all specially protected and specially managed areas will require management plans where none have previously been adopted.

134. An intersessional contact group will build upon the outcome of the second workshop on Antarctic protected areas, held prior to the Twenty-third Antarctic Treaty Consultative Meeting and the first workshop held during the Twenty-second Meeting.

135. New and revised management plans approved at the Twenty-first, Twenty-second and Twenty-third Consultative Meetings are listed in table 3 below.

136. By decision 4 (1998), the Twenty-second Antarctic Treaty Consultative Meeting requested CCAMLR to comment on protected area management plans where there is actual harvesting, potential capability of harvesting marine living resources, or a provision in a plan that might prevent or restrict CCAMLR-related activities, such as the CCAMLR ecosystem monitoring programme.

137. By resolution 2 (1998), the Meeting recommended that the guide to the preparation of management plans for Antarctic specially protected areas be used by those engaged in the preparation and/or revision of management plans.

Table 3
New and revised management plans approved at the Twenty-first, Twenty-second and Twenty-third Antarctic Treaty Consultative Meetings

Plan[a]	*Type*	*Antarctic Treaty Consultative Meeting*
SPA 5 Beaufort Island	Revised	Twenty-first (Measure 1)
SPA 25 Cape Evans historic site and its environs	New	Twenty-first (Measure 2)
SPA 26 Lewis Bay Tomb	New	Twenty-first (Measure 2)
SSSI 11 Tramway Ridge	Revised	Twenty-first (Measure 3)
SSSI 12 Canada Glacier, Taylor Valley, Victoria Land	Revised	Twenty-first (Measure 3)
SSSI 13 Potter Peninsula, 25 de Mayo Island, South Shetlands Islands	Revised	Twenty-first (Measure 3)
SSSI 14 Harmony Point, Nelson Island, South Shetland Islands	Revised	Twenty-first (Measure 3)
SSSI 15 Cierva Point, Danco Coast, Antarctic Peninsula	Revised	Twenty-first (Measure 3)
SSSI 37 Botany Bay, Cape Geology, Victoria Land	New	Twenty-first (Measure 3)
Historic monument: Memorial Cross, Lewis Bay, Ross Island	New	Twenty-first (Measure 4)
SPA 41 Stone hut on Paulet Island	Revised	Twenty-first (Measure 5)
SPA 27 Cape Royds historic site and its environs	New	Twenty-second (Measure 1)
SPA 28 Hut Point historic site	New	Twenty-second (Measure 1)
SPA Cape Adare historic site and its environs	New	Twenty-second (Measure 1)
Historic site: South-west coast of Elephant Island, South Shetland Islands	New	Twenty-second (Measure 2)
SSSI 23 Svarthamaren	Revised	Twenty-third (Measure 1)

[a] The following acronyms are used: SPA (specially protected area) and SSSI (site of special scientific interest).

J. Sea ice and ice sheets

138. There has been retreat of ice shelves north of the minus 5 degree Celsius isotherm (i.e., Wordie, Larsen A, Muller, Prince Gustav Channel and Larsen Inlet), while those south of and below the limit have yet to show changes.[27] In 1997, ASOC also noted that deep holes and cracks in the Larsen B ice shelf suggested its imminent collapse.[51] Break-up of Larsen B appeared to accelerate in April 1999.

K. Question of liability

139. In accordance with article 16 of the Protocol on Environmental Protection, the Consultative Parties undertake to elaborate rules and procedures relating to liability for damage arising from activities taking place in the Antarctic Treaty area and covered by the Protocol, and those rules and procedures should be included in one or more annexes. To date, no such annexes have been developed.

140. At the Twenty-first Antarctic Treaty Consultative Meeting, the Group of Legal Experts on Liability reported that there was lack of clarity with regard to a number of matters, including the definition of damage, the actions to be taken by operators, the reimbursement of costs, unrepaired damage and the process for the settlement of disputes.[82]

141. The report of the Group of Legal Experts included seven key issues on which there is no clear agreement among Treaty Parties:[83]

(a) Whether a single annex should be drafted with a comprehensive approach to all categories of harmful impact or whether more than one annex should be envisaged with initial consideration given to an annex dealing with the failure to take response action in the event of environmental emergencies;

(b) Whether an annex on liability should contain obligations for the operator to take precautionary measures, response action or remedial measures;

(c) Whether all activities in the Antarctic Treaty area should be addressed by a liability annex in a uniform way and what effect a liability regime might have on cooperation between States Parties;

(d) Whether it would be appropriate to require compensation for environmental damage when either nothing has been done to repair the damage or the damage could not be repaired, and on what basis the amount of compensation for such unrepaired damage should be determined;

(e) Whether an annex on liability should provide for the establishment of an environmental protection fund and, if so, how the fund should be administered;

(f) Whether environmental impacts resulting from activities found acceptable by national authorities following procedures for environmental impact assessments should be excluded from a liability regime and, if so, whether the exclusion should apply to both initial environmental evaluations and comprehensive environmental evaluations;

(g) Whether the harmful impact of activities which are lawful under the Protocol should nevertheless attract liability.

142. The Twenty-second Antarctic Treaty Consultative Meeting, by decision 3 (1998), decided that the Group of Legal Experts on Liability had ended its task by submitting its report and that further negotiations of an annex or annexes would take place in Working Group 1. These negotiations would include input from SCAR, COMNAP and others on risk assessments, concentrating on factual information about the likely types and scales of environmental damage and the financial magnitude of such damage.

143. The Twenty-third Antarctic Treaty Consultative Meeting affirmed its commitment to develop a liability regime. From thematic deliberations during the meeting the following areas of convergence were identified:[84]

(a) The approach should involve consideration of preventative measures, response action and liability;

(b) The term "operator" should include all States parties and all public and private entities engaged in activities in the Antarctic Treaty area and authorized by or under the jurisdiction and control of a State party;

(c) There should be a regime of strict liability, that is, no need to prove an operator acted intentionally or negligently;

(d) Exemptions from liability would be for acts of God, *force majeure*, armed conflict, or acts of terrorism;

(e) Scientific activities would not be exempt from the liability regime;

(f) Where the need arises for response action in order to prevent environmental damage, a State Party may request the cooperation of, or give its consent for, a third party to take such action.

144. The Twenty-third Antarctic Treaty Consultative Meeting, by resolution 5 (1999), requested COMNAP and SCAR to be represented at meetings where liability is discussed, and to prepare a working paper for submission to the Twenty-fourth Antarctic Treaty Consultative Meeting, on the operational and scientific aspects of preventative measures and response action to enlighten and facilitate work on liability issues. No time-frame was set for completion of negotiations.

L. Antarctic tourism and other non-governmental operations

145. From 1992/1993 to 1995/1996, there was a 40 per cent increase in the number of shipborne tourists, whereas from 1995/1996 to 1996/1997, there was a 21 per cent decrease (see table 4 below). The increases relate to the addition of Russian vessels to Antarctic tourism.[85] The major factor controlling the scale of shipborne tourism at present is the presence and/or absence of large tour ships (i.e., those carrying more than over 250 passengers).[85]

146. The majority of Antarctic voyages are to the Antarctic Peninsula region; only 7 of 114 departures during 1996/1997 and 8 of 106 voyages during 1997/1998 took place outside this region.[36]

147. The number of yacht visits to Antarctica has steadily increased, generally by one or two per year, from the 1970s to the 1990s (see table 4). Yachts are increasingly taking paying passengers and many commercial yacht operators are not IAATO members.

148. Land-based tourism is operated by IAATO member Adventure Network International. As shown in table 4, there have recently been over 100 land-based tourists per season.

Table 4
Tourist numbers in Antarctica, 1992/1993-1998/1999

	Year						
	1992/1993	*1993/1994*	*1994/1995*	*1995/1996*	*1996/1997*	*1997/1998*	*1998/1999*
Number of shipborne tourists	6 585[a]	8 016[a]	8 098[a]	9 212[a]	7 322[a]	9 378[b]	9 857[e]
Number of tourist vessels (number of Russian vessels)					13 (9)[d]	14 (6)[b]	15 (7)[e]
Number of yacht cruises (number of tourists)	18[c]	19[c]	19[c]	13[c]	24[c]	11 (95)[b]	11 (90)[e]
Number of land-based tourists					106[d]	131[b]	79[e]
Sightseeing flights					10[d]	9[b]	9[e]

[a] Paper prepared by the United States on the status of and trends in shipborne tourism in Antarctica (Information paper No. 90, submitted to the Twenty-first Antarctic Treaty Consultative Meeting, Christchurch, New Zealand, 19-30 May 1997).

[b] Paper prepared by IAATO containing an overview of Antarctic tourism activities (Information paper No. 86, submitted to the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[c] Paper prepared by the United Kingdom on yacht visits to the Antarctic during the period 1970-1998 (Information paper No. 1, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[d] Paper prepared by IAATO containing a summary of Antarctic tourism activities for the period 1996-1998 and a five-year projection for 1997-2002 (Information paper No. 75, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[e] Paper prepared by IAATO containing an overview of Antarctic tourism activities (Information paper No. 98, submitted to the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

149. Qantas Airlines operates sightseeing flights during the day over the Antarctic; there are at present 9 or 10 per year (see table 4).

150. An inventory of sites visited by tourists has been carried out since 1994 by trained investigators placed on tour ships in the Antarctic Peninsula region. This inventory will provide the baseline information necessary to determine how best to minimize the environmental effects of tourism and non-governmental activities. This work is being carried out cooperatively between the United States and the United Kingdom, with valuable assistance provided by Argentina, Chile and tour operators. From the information collected, the *Compendium of Antarctic Visitor Sites: A Report to the Governments of the United States and the United Kingdom* has been published, and is available from the United States Department of State, Office of Ocean Affairs, and the United Kingdom Foreign and Commonwealth Office, Polar Regions Section.

151. By resolution 3 (1997), the Twenty-first Antarctic Treaty Consultative Meeting recommended that a standard form be used for advance notifications and post-visit reporting in Antarctica in order to obtain consistent information that will facilitate an analysis of the scope, frequency and intensity of tourism and non-governmental activities. A standard form was reviewed and revised by Treaty parties, and is now used by tour operators. Improved methods of data management are needed to collate information on tourism and non-governmental activities.

152. Operational safety issues of ships in Antarctic waters is of concern to the Treaty parties and is being considered in terms of a polar shipping code, as elaborated upon in para. 112 above.

153. Fuel spills in the marine environment pose a far greater magnitude of risk to wildlife and the environment than do terrestrial spills. Therefore, the apparent trend towards large tourist vessels in Antarctic waters is of concern to COMNAP because of the large volume of fuel stored in such vessels and the likelihood that such fuel is stored adjacent to the hull.[86]

154. The concern about large ships and the potential environmental risk that they present, led the Twenty-third Antarctic Treaty Consultative Meeting to adopt resolution 6 (1999), urging non-Consultative Parties that have not yet become parties to the Protocol on Environmental Protection to the Antarctic Treaty, in particular those with Antarctic tourist activities in their territory, to adhere to the Protocol as soon as possible.

155. Antarctic tour operators support logistical operations and scientific programmes in the Antarctic by providing transport.

156. All IAATO members have completed environmental impact assessments and one member has also filed an initial environmental evaluation.[86]

157. It is predicted by IAATO that Antarctica will remain a specialized and relatively expensive niche destination offered by a limited number of experienced operators which focus on educational voyages to areas of exceptional natural history and wilderness value.

M. Arctic and Antarctica

158. The Arctic Council was inaugurated in 1996[87] and provides for cooperation, coordination and integration among the eight Arctic States. The Council includes the Governments of Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden and the United States of America. The major indigenous organizations in the Arctic are also permanent participants in the Council. There is a systematic exchange of information between the Antarctic Treaty system and the Arctic Council.

159. The legal situations in the Arctic and Antarctica are quite different. There is, however, a need to facilitate the exchange of information on scientific and logistical activities in the polar regions. SCAR has been facilitating interaction concerning scientific activities in the Arctic and Antarctic. This includes cooperation with the International Arctic Science Committee (IASC) on the climatic, chemical, glaciological and biological responses of the respective polar regions to global change. RADARSAT, a sophisticated mapping satellite, is gathering data in both the Arctic and Antarctic regions. Studies of the arctic stratosphere and ionosphere are being coordinated by investigations in Antarctica. The multidisciplinary research station in east Greenland, the Zackenberg Ecological Research Organization (ZERO), is part of a small network collecting long-term data that will serve as a reference for comparisons with the Antarctic by providing data from an area of the Arctic relatively unaffected by human influence. In addition, a symposium on global aspects of climate

change was held, jointly sponsored by SCAR and IASC, with 240 participants. To further the exchange of information, JCADM arranged its annual meeting in cooperation with its Arctic sister organization, the Arctic Environmental Data Directory (ADD), and they agreed to continue to work towards closer integration.

IV. Concluding remarks

160. The Antarctic Treaty system continues to provide a unique example of international cooperation on the basis of international agreements. Designated as a natural reserve, devoted to peace and science, Antarctica is the scene of successful international cooperation in research, in particular in connection with the study of global changes.

161. With the entry into force of the Protocol on Environmental Protection (the Madrid Protocol) on 14 January 1998, after its ratification by all Antarctic Treaty Consultative Parties, human activities in Antarctica are being further regulated to protect the Antarctic environment and its dependent and associated ecosystems. The future entry into force of annex V to the Madrid Protocol, on area protection and management, confirms the commitment of the Parties to the protection of this unique ecosystem.

162. There are, however, some issues of concern and possible challenges that will have to be addressed. Unreported, unregulated and illegal fishing for toothfish in the Southern Ocean is a major concern since it threatens not only toothfish but also other dependent and related species, hence undermining the objectives of the Convention on the Conservation of Antarctic Marine Living Resources. This issue should receive the attention of all States that carry out fishing activities in the Southern Ocean.

163. No agreement has been reached on one or more annexes to the Madrid Protocol concerning liability for environmental damage. It is hoped that discussions will continue diligently towards reaching a consensus among the Antarctic Treaty Consultative Parties on such a liability regime.

164. Antarctic tourism is a growing industry, with the number of tourists and tour vessels increasing steadily. Tourism activities present risk to the Antarctic marine and terrestrial environments. Efforts are being made by the Antarctic Treaty Parties and IAATO to prevent and mitigate the environmental impacts of the tourism industry, and should be continued.

Notes

[1] The present report has been prepared on behalf of the Secretary-General by UNEP, with the assistance of GRID, located at Gateway Antarctica: the Centre for Antarctic Studies, University of Canterbury, New Zealand.

[2] United Nations, *Treaty Series*, vol. 402, No. 5778.

[3] Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998, decision 1 (1998).

[4] Report of the Depositary Government (United States of America) for the Antarctic Treaty and its Protocol (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[5] Final Report of the Twenty-first Antarctic Treaty Consultative Meeting, Christchurch, New Zealand, 19-30 May 1997.

[6] Ibid., para. 101.

[7] Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999, agenda item 14, "Inspections under the Antarctic Treaty".

[8] Report of Germany and the United Kingdom of Great Britain and Northern Ireland on a joint inspection under article VII of the Antarctic Treaty (Working paper No. 23, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[9] Report of Belgium and France on a joint inspection in eastern Antarctic conducted in 1999 under article VII of the Antarctic Treaty (Information paper No. 42, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[10] *Handbook of the Antarctic Treaty System*, 8th ed. (United States of America, Department of State, Washington, D.C., April 1994).

[11] Report of the Depositary Government (United States of America) for the Antarctic Treaty and its Protocol (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[12] Report on the second meeting of the Committee for Environmental Protection (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[13] Paper prepared by New Zealand on the implementation of the Protocol on Environmental Protection by the Antarctic Treaty Consultative Parties (Information paper No. 2, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[14] United Kingdom of Great Britain and Northern Ireland: paper on the implementation of the Protocol on Environmental Protection to the Antarctic Treaty (Information paper No. 15, submitted to the Twenty-first Antarctic Treaty Consultative Meeting); report on the implementation of the Environmental Protocol to the Antarctic Treaty (Information paper No. 3, submitted to the Twenty-second Antarctic Treaty Consultative Meeting); and paper on the implementation of the Protocol (Information paper No. 17, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[15] Paper prepared by Norway on Norwegian procedures developed in accordance with article I of annex I to the Protocol on Environmental protection and Norwegian regulations relating to the protection of the environment in Antarctica (Information paper No. 38, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[16] Paper prepared by China on the measures being adopted for Antarctic environmental protection by the Chinese Antarctic and Arctic Administration (Information paper No. 89, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[17] Japan: paper on the law relating to protection of the environment in Antarctica (Information paper No. 112, submitted to the Twenty-first Antarctic Treaty Consultative Meeting); and report on the measures taken for the implementation of the Protocol on Environmental Protection to the Antarctic Treaty (Information paper No. 45, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[18] Paper prepared by Brazil on the implementation of the Protocol on Environmental Protection to the Antarctic Treaty (Information paper No. 128, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[19] Papers prepared by the Netherlands on Dutch legislation for the implementation of the Protocol, on the Protection of the Antarctica Act, and on a draft decree for the protection of Antarctica (Information papers Nos. 31, 32 and 33, respectively, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[20] Papers prepared by Uruguay on measures adopted for the implementation of the Protocol on Environmental Protection to the Antarctic Treaty (Information paper No. 38, submitted to the Twenty-second Antarctic Treaty Consultative Meeting; and information paper No. 18, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[21] Paper prepared by Chile on enforcement of the Protocol on Environmental Protection to the Antarctic Treaty (Information paper No. 43, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[22] Paper prepared by the Russian Federation on measures to ensure the implementation of the Protocol on Environmental Protection to the Antarctic Treaty upon its ratification by the Russian Federation (Information paper No. 63, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[23] Report of the United States of America with respect to article 13 (1) of the Protocol on Environmental Protection to the Antarctic Treaty (Information paper No. 73, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[24] Papers prepared by Finland on the implementation of the Madrid Protocol to the Antarctic Treaty in Finland, and on Finnish legislation implementing the Protocol (Information papers Nos. 110 and 114, respectively, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[25] Papers prepared by Bulgaria concerning its application for consultative status (Information paper No. 125, submitted to the Twenty-second Antarctic Treaty Consultative Meeting) and on the implementation by Bulgaria of the Protocol on Environmental Protection to the Antarctic Treaty (Information paper No. 120, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[26] Paper prepared by Spain on action taken by it in relation to the implementation of the Protocol on Environmental Protection to the Antarctic Treaty (Information paper No. 29, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[27] Report of the Depositary Government (United Kingdom) for the Convention for the Conservation of Antarctic Seals (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[28] Reports of the Depositary Government (United Kingdom) for the Convention for the Conservation of Antarctic Seals (see annex E to the Final Report of the Twenty-first Antarctic Treaty Consultative Meeting, Christchurch, New Zealand, 19-30 May 1997); annex F to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998; and the Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[29] Report by the head of the delegation of Australia, representing the Depositary Government for the Convention for the Conservation of Antarctic Marine Living Resources (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[30] Statement by the observer for CCAMLR at the Twenty-first Antarctic Treaty Consultative Meeting, held at Christchurch, New Zealand, from 19 to 30 May 1997 (see annex E to the Final Report of the Meeting); and reports of the observer for CCAMLR (see annex F to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998; and the Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[31] Statement by the observer for CCAMLR at the Twenty-first Antarctic Treaty Consultative Meeting, held at Christchurch, New Zealand, from 19 to 30 May 1997 (see annex E to the Final Report of the Meeting).

[32] Report of the observer for CCAMLR (see annex F to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[33] Report of SCAR (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[34] Report of COMNAP (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[35] Report of IAATO (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[36] Papers prepared by IAATO containing a summary of Antarctic tourism activities for the period 1996-1998 and a five-year projection for 1997-2002 (Information paper No. 75, submitted to the Twenty-first Antarctic Treaty Consultative Meeting) and an overview of Antarctic tourism activities (Information paper No. 86, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[37] Report of IHO (see annex G to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[38] Statement by IOC (see annex F to the Final Report of the Twenty-first Antarctic Treaty Consultative Meeting, Christchurch, New Zealand, 19-30 May 1997).

[39] Report of ICUN (see the Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[40] Report of WMO in relation to article III (2) of the Antarctic Treaty (see annex F to the Final Report of the Twenty-first Antarctic Treaty Consultative Meeting, Christchurch, New Zealand, 19-30 May 1997).

[41] Report of WMO (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[42] Report of WMO (see annex G to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[43] Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999, agenda item 16, "Operational issues".

[44] Paper prepared by Peru on the use of alternative energy in the Peruvian scientific station of Machu Picchu (Information paper No. 19, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[45] Paper prepared by Sweden on environmental aspects of energy use in the Swedish Antarctic programme (Information paper No. 14, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[46] Paper prepared by Japan on alternative energy at Syowa Station (Information paper No. 62, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[47] Paper prepared by the Russian Federation on Russian activity in the ulitization of renewable energy sources in Antarctica (Information paper No. 75, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[48] Paper prepared by WMO on its networks supporting Antarctic operations and research (Information paper No. 49, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[49] Report of COMNAP (see annex E to the Final Report of the Twenty-first Antarctic Treaty Consultative Meeting, Christchurch, New Zealand, 19-30 May 1997).

[50] Paper prepared by SCAR on its global change research programme (Information paper No. 92, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[51] Paper prepared by ASOC on climate changes and Antarctica (Information paper No. 109, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[52] Paper prepared by New Zealand containing an update of activities in relation to stratigraphic drilling east of Cape Roberts in the south-west Ross Sea, Antarctica (Information paper No. 4, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[53] Report on the second meeting of the Committee for Environmental Protection (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[54] Papers prepared by the Russian Federation on studies of subglacial Lake Vostok (Information paper No. 64, submitted to the Twenty-second Antarctic Treaty Consultative Meeting) and on activities of the Russian Antarctic expedition in respect of those studies (Information paper No. 77, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[55] Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998.

[56] Paper prepared by Australia on major initiatives in Australian Antarctic science (Information paper No. 50, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[57] Working paper No. 4, submitted to the Twenty-third Antarctic Treaty Consultative Meeting.

[58] Paper prepared by the United States of America on the development of an environmental monitoring programme (Information paper No. 34, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[59] Report of New Zealand on the work of the inter-sessional contact group on a state of the Antarctic environment report (Working paper No. 11, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[60] Report of Sweden on the work of the inter-sessional contact group on a state of the Antarctic environment report (Working paper No. 5, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[61] Paper prepared by New Zealand containing an update of programme made with regard to the Ross Sea region state of the environment report (Information paper No. 1, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[62] Papers prepared by New Zealand containing a report on inter-sessional work and on the further understanding of the terms "minor" and "transitory" (Working papers Nos. 34 and 35, respectively, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[63] Report on the meeting of the Committee for Environmental Protection (see annex E to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[64] Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999, agenda item 6, "Report of the Committee for Environmental Protection".

[65] Paper prepared by COMNAP containing a summary of environmental impact assessments, audits/reviews and related documents prepared for activities in Antarctica (Information paper No. 57, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[66] Paper prepared by COMNAP on emergency contingency planning (Information paper No. 6, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[67] Report of COMNAP (see the Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999).

[68] Final Report of the Twenty-first Antarctic Treaty Consultative Meeting, Christchurch, New Zealand, 19-30 May 1997, para. 110.

[69] Paper prepared by Argentina on a waste management and environmental protection plan for Marambio Station (Information paper No. 17, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[70] Paragraph 34 of the report on the meeting of the Committee for Environmental Protection (see annex E to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998), and paper prepared by Italy on waste management at the Italian Terra Nova Bay Station (Information paper No. 34, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[71] Paragraph 35 of the report on the meeting of the Committee for Environmental Protection (see annex E to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[72] Report of the observer for CCAMLR (see Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 25 May-4 June 1998).

[73] Current status report of WMO on Antarctic stratospheric ozone (Information paper No. 106, submitted to the Twenty-third Antarctic Treaty Consultative Meeting).

[74] Current status report of WMO on Antarctic stratospheric ozone (Information paper No. 44, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[75] Current status report of WMO on Antarctic stratospheric ozone (Information paper No. 77, submitted to the Twenty-second Antarctic Treaty Consultative Meeting).

[76] Paper prepared by SCAR on scientific research in the Antarctic (Information paper No. 33, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[77] Paper prepared by Australia on the introduction of disease into Antarctic birds (Information paper No. 51, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[78] Report of IUCN (see annex G to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[79] Report of ASOC (see annex G to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[80] Report of the Depositary Government (United Kingdom) for the Convention for the Conservation of Antarctic Seals (see annex E to the Final Report of the Twenty-first Antarctic Treaty Consultative Meeting, Christchurch, New Zealand, 19-30 May 1997).

[81] Report of the Depositary Government (United Kingdom) for the Convention for the Conservation of Antarctic Seals (see annex F to the Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[82] Final Report of the Twenty-first Antarctic Treaty Consultative Meeting, Christchurch, New Zealand, 19-30 May 1997, para. 72.

[83] Report of the Group of Experts on Liability (Working paper No. 1, submitted to the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998).

[84] Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999, agenda item 10, "The question of liability as referred to in article 16 of the Protocol".

[85] Paper prepared by the United States on the status of and trends in shipborne tourism in Antarctica (Information paper No. 90, submitted to the Twenty-first Antarctic Treaty Consultative Meeting).

[86] Final Report of the Twenty-third Antarctic Treaty Consultative Meeting, Lima, 24 May-4 June 1999, agenda item 13, "Tourism and non-governmental activities in the Antarctic Treaty area".

[87] Final Report of the Twenty-second Antarctic Treaty Consultative Meeting, Tromso, Norway, 25 May-5 June 1998, para. 97.